FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 843. (No. 8, Vol. XVII.) FEBRUARY 19, 1925 [Weekly, Price 6d. Post free, 7d.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.

Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828

Annual Subscription Rates, Post Free:

United Kingdom .. 30*s.* 4*d.* Abroad .. .. 33*s.* 0*d.**

These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates

* *European subscriptions must be remitted in British currency*

CONTENTS

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :—

1925

Feb. 19 .... **Lieut.-Col. L. F. R. Fell: "Light Aeroplane Engine Development," before R.Ae.S. (Society of Arts).**

Feb. 20 .... **Professor E. G. Coker, D.Sc., F.R.S.: "Photo-Elastic Methods of Measuring Stress," before I.Ae.E.**

Feb. 25 .... **H. Richardo, Esq., M.A.: (Subject to be announced later), before C.U.Ae.S.**

Mar. 4 .... **Alan Chorlton, Esq. (Managing Director of Messrs. Beardmore, Ltd.): "The All Steel Aircraft," before C.U.Ae.S.**

Mar. 5 .... **Lieut.-Col. C. B. Heald, C.B.E. (Medical Adviser to the Director of Civil Aviation, Air Ministry): "Some Medical Aspects of Air Transport," before R.Ae.S.**

Mar. 6 .... **M. E. Dewoitine: "The Advantages of Metal Construction," before I.Ae.E.**

Mar. 11 .... **G. Bradshaw, Esq.: "The Failure of the Petrol Engine as a Prime Mover."**
Presidential Address. Election of Officers. Before C.U.Ae.S.

EDITORIAL COMMENT.

THE aviation community will, at any rate so it is hoped, be particularly interested in two papers to be read this week. They are of a totally different character, but each in its own sphere should prove of more than ordinary value. The one is of very direct practical interest, and the other, although it deals with a subject which superficially may appear to be a matter for research rather than for the practical constructor, may, and does, have its immediate practical applications. It is therefore to be hoped that both lectures will be more than usually well attended, as no one claiming to be seriously interested in the progress and future of aviation can afford to miss either lecture.

Two Papers

The paper to be read by Lieut.-Col. Fell before a joint meeting of the Royal Aeronautical Society this evening (Thursday, February 19) has for its title "Light Aeroplane Engine Development." This, of course, is a subject that is very much to the fore at the present moment, and in fact the present may be said to be quite a critical time in British aviation history, inasmuch as a very great deal will depend upon the decisions come to on the subject of what is a light 'plane and a light 'plane engine.

To take the machine first. No definition has yet been given, or at any rate none has been generally accepted, of what constitutes a light 'plane. In the earlier days of the movement there was prevalent an idea that we were on the eve of a new era in aviation, and that within a comparatively short time we should have "motor gliders" darkening the skies in numbers not far short of the number of motor-cycles now on the roads of Britain. The results obtained at the first Lympne competition were very encouraging, obtained as they were with engines of motor-cycle type. It was, however, found that the work imposed upon the small engines was somewhat severe, but what mainly caused the second Lympne meeting to be more or less of a failure was the fact that, someone having discovered that nobody wanted to fly solo, two-seaters were called for, and the engine volume was only increased from 750 c.c. in the case of the single-seaters to 1,100 c.c. for the two-seaters. This

increase in size, although theoretically it should have given somewhat similar loadings, was not found in practice to do so, and the rules that had been laid down were found to be unduly severe in the matter of high speed over considerable distances (two sets of flights of five laps of the course). The result not unnaturally was that after the competitions last year the Air Ministry did not feel justified in recommending the use of any of the machines taking part, for use by the light 'plane clubs, at any rate until the engine question had been settled. Up to the present time this question has not been settled, and this is one of the reasons why Col. Fell's paper should be of unusual interest.

It is probably becoming generally realised that a mistake was made originally in choosing cubic capacity as a basis, since this gives wholly fictitious standards, and does not appear to produce the type of machine that is really required. Engine capacity as such does not greatly matter, even as regards the question of fuel consumption, as was demonstrated at the first Lympne meeting when the A.N.E.C. monoplane with its 696 c.c. Blackburne engine gave the same mileage (87·5 miles per gallon) as the English Electric Company's "Wren" with a 400 c.c. A.B.C. engine. That even with an engine of relatively large capacity good fuel economy is attainable was shown by the Avro "Baby" fitted with four-cylinder water-cooled Green engine. This machine did rather more than 30 miles per gallon, and that at a cruising speed of about 70 miles per hour. It is doubtful if the average mileage at Lympne last year was very much better than this figure, and certainly the average cruising speeds were lower.

In this connection it is, perhaps, significant that the De Havilland Aircraft Company is producing a two-seater school machine to be fitted with a "Cirrus" engine produced by the Aircraft Disposal Company. The D.H. "Moth" is considerably larger than the Lympne light 'planes, its total loaded weight being 1,350 lb., while the "Cirrus" engine is quite a large affair, with a cubic capacity of in the neighbourhood of 4½ litres. Thus, neither engine nor machine appears to come within measurable distance of being in the light 'plane class, as hitherto understood. Yet it seems highly probable that both will prove very successful. We are not at all sure that the ultimate light 'plane will have an engine of 4½ litres' capacity, but we do feel that no good is done by limiting the capacity to any particular figure. If, as is to be hoped, we are to have another light 'plane competition this year, some other basis must be found upon which to judge machines, and a formula should be evolved which will give the greatest possible freedom to designers in the matter of engine types and engine sizes. The paper to be read by Col. Fell, and the discussion following it, should do much towards elucidating the problems.

The second paper to which we have referred is that to be read before the Institution of Aeronautical Engineers at University College, Gower Street, on Friday, at 6.30 p.m. The author of this paper is Professor E. G. Coker, F.R.S., whose subject is to be "Photo-elastic methods of measuring stress." It may be recollected that on November 20, 1918, a paper on this subject, as applied to aircraft structures, was read before the Royal Aeronautical Society by Major A. R. Low. Professor Coker, upon whose work to a large extent Major Low's paper was based, has continued his researches into the problem, and we understand that his lecture on Friday is to be of a rather more elementary character, so that those who have had no previous knowledge of the subject should be able to obtain a very good idea of the principles involved.

It seems somewhat curious that the photo-elastic method of measuring stress has not been taken up by the Air Ministry, as it seems capable of supplying valuable information in cases where the ordinary methods of calculation fail. The fact that recently certain very unfortunate structural failures of aircraft have occurred appears to indicate that present official methods are not infallible, and that we are beginning to cut our "factors of ignorance" too fine. If for no other reason, the subject of Professor Coker's paper should be of special interest.

◈ ◈

An R.A.F Honour

AT the Investiture held by H.M. the King at Buckingham Palace on February 12, Air Commodore Arthur Longmore received the honour of Companion of the Order of the Bath (Military Division).

New Principal Air Aide-de-Camp and Air Aide-de-Camp Appointed

THE Air Ministry announces the appointments of Air Marshal Sir John Maitland Salmond, K.C.B., C.M.G., C.V.O., D.S.O., as Principal Air Aide-de-Camp to the King *vice* Air Chief Marshal Sir Hugh Trenchard, Bart., G.C.B., D.S.O., and of Group Captain Cecil Francis Kilner, D.S.O., as Air Aide-de Camp *vice* Air Commodore Cyril Louis Norton Newall, C.M.G., C.B.E., A.M.

Vacancies for R.A.F. Apprentices

THE Air Ministry announces in continuation of the policy of training Aircraft Apprentices in the skilled trades of the Royal Air Force, two examinations for the entry in September next of 700 suitable boys will be held within the next few months. The "Open Competition," conducted by the Civil Service Commissioners, Burlington Gardens, London, W. 1, will take place on April 17. The closing date for the receipt of completed forms of application is March 5. Candidates with special claims on account of their fathers' service in His Majesty's Forces who have not already applied for a "Service Nomination" should forward full particulars to the Secretary, Air Ministry (M. 1), Kingsway, London, W.C., before February 25. The "Limited Competition," which is carried out by the Air Ministry in conjunction with the local education authorities, will be held on June 2. Boys who are still at school should apply to their Headmasters with a view to securing a nomination from the education authority responsible for the school. If they have left school they should apply to the Advisory Committee for Juvenile Employment in their Area. Boy Scouts can apply to the authorities of the Boy Scout Association, and Territorial Cadets to the Officers Commanding their Units. The form of nomination for this examination must be received by the Air Ministry (A.E.) not later than May 5. Candicates must be physically fit and normally between the ages of 15 and 16½ at the time of entry. In certain cases, excluding candidates for entry under the "Open Competition," an extension of the age limit up to 17 years will be considered. When appointed as aircraft apprentices boys are given three years' training in a skilled trade and general education by civilian schoolmasters during this period up to the standard of a good technical school. The principal trades open to boys, who are invited in advance to indicate their preference, are carpenters, fitters, aero engine, fitter drivers, fitter armourer, coppersmith and wireless operator mechanic. In assigning boys to the various trades every endeavour is made to give effect to each boy's individual preference, the wishes of the boys in this respect being considered in the order of their position on the examination list.

Institution of Aeronautical Engineers

Will our readers please note that Prof. E. G. Coker's paper on "Photo-Elastic Methods of Measuring Stress," to be read tomorrow night, will be held in the Lecture Theatre of his Laboratory at the University College, Gower Street, and *not* at the Engineers' Club.

FLIGHT

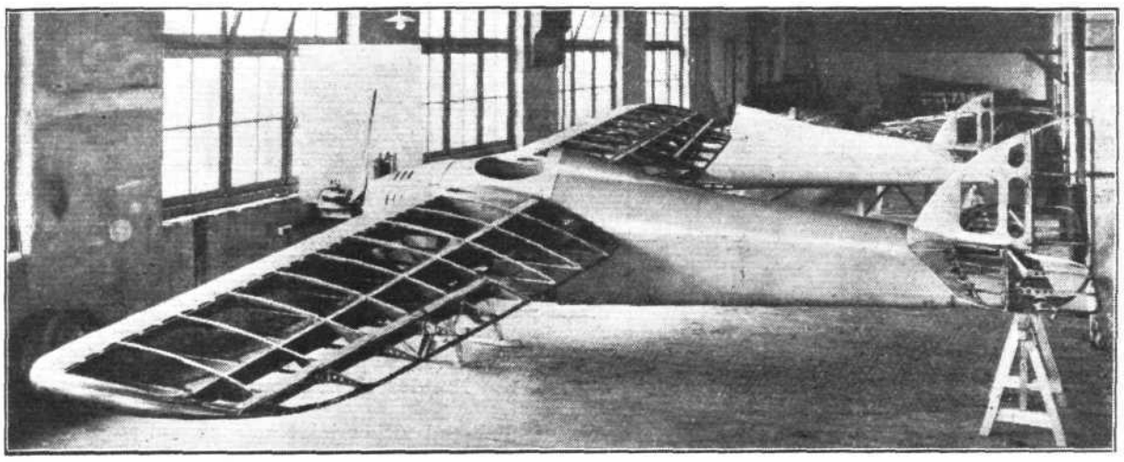
THE PANDER LIGHT MONOPLANE

30 H.P. "Y"-Type Anzani Engine

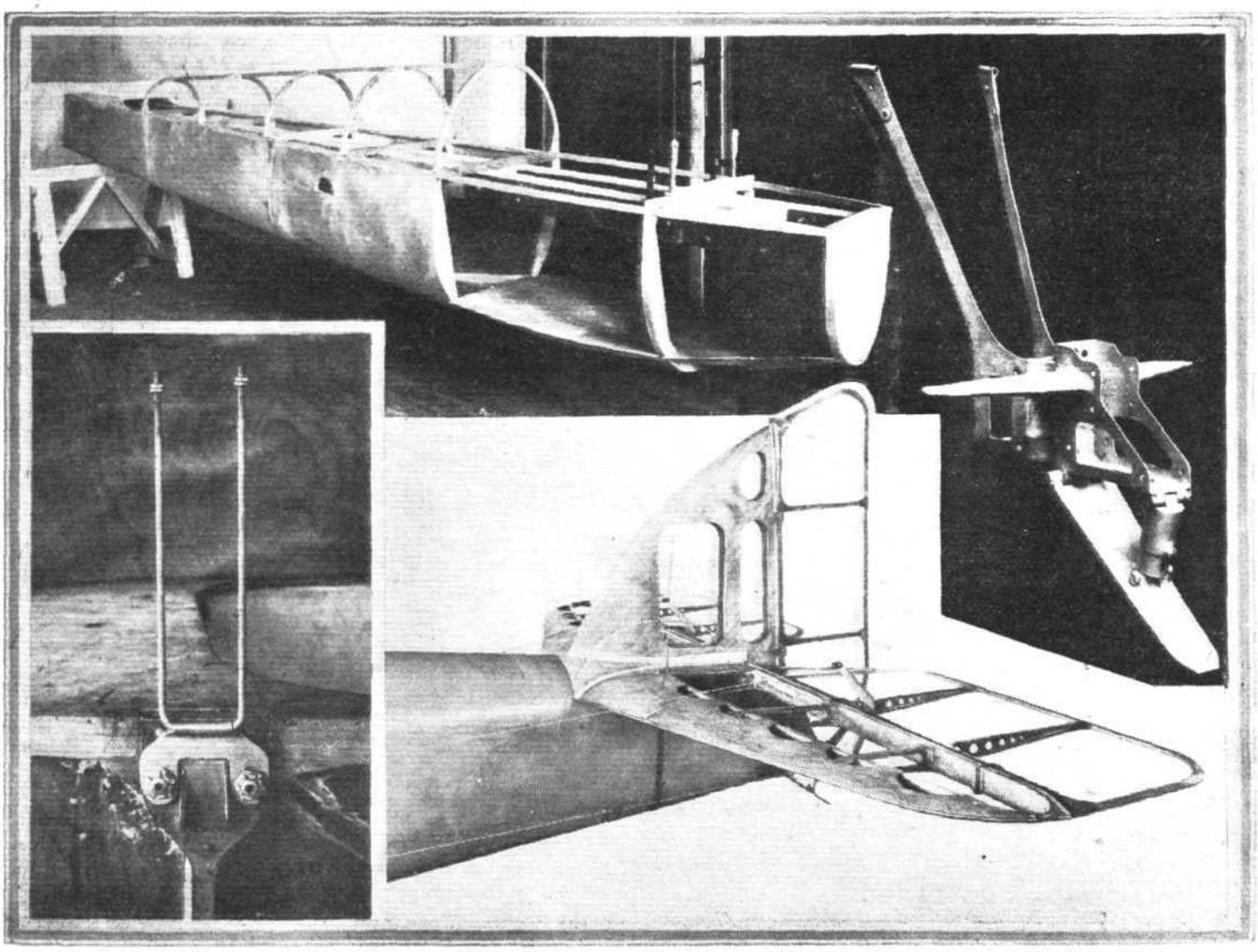
IN our issue of December 25, 1924, containing a report of machines exhibited at the Paris Aero Show, we published a brief description and a few sketches of the Pander light monoplane. This machine, which was perhaps one of the prettiest in the Grand Palais, and was exceptionally well finished, has now been built in several examples, one of which was flying daily at Le Bourget during the Paris Show, where it created a very favourable impression. This week we give a slightly more detailed description of the machine, which is being built by Pander & Zonen, of the Hague, Holland.

It may be argued that the Pander, with an engine of considerably more than 1,100 c.c. capacity, is not a light 'plane according to British standards. It is, however, a low-power machine and may be classed as a light 'plane, at any rate until some official ruling on the question of what constitutes a light 'plane is given.

In general design the Pander is a perfectly straightforward monoplane of the cantilever type, and except for pointing out its very clean lines, the aerodynamic design does not appear to call for comment. Careful streamlining has been



Two Pander light monoplanes in course of construction.



THE PANDER LIGHT MONOPLANE : Above, a view of the fuselage in course of construction. Below, the tail. On the right, the tail skid and fittings, and on the left, one of the U-bolts which secure the wing spars to the fuselage

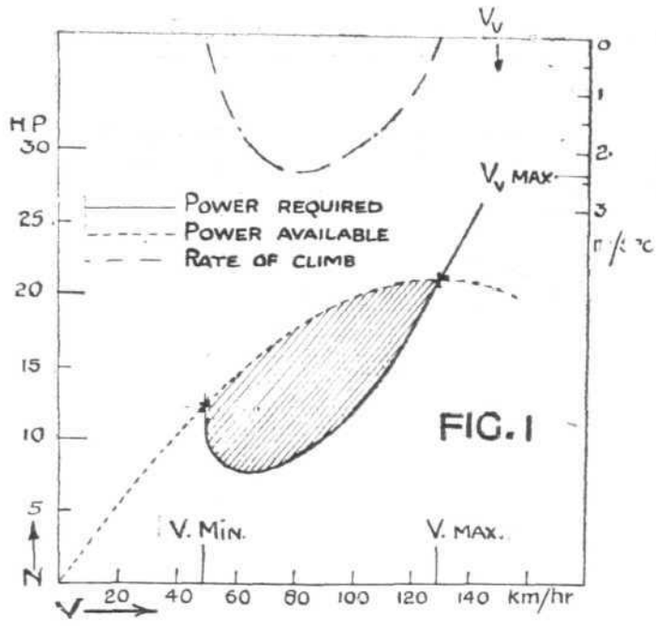


FIG. 1

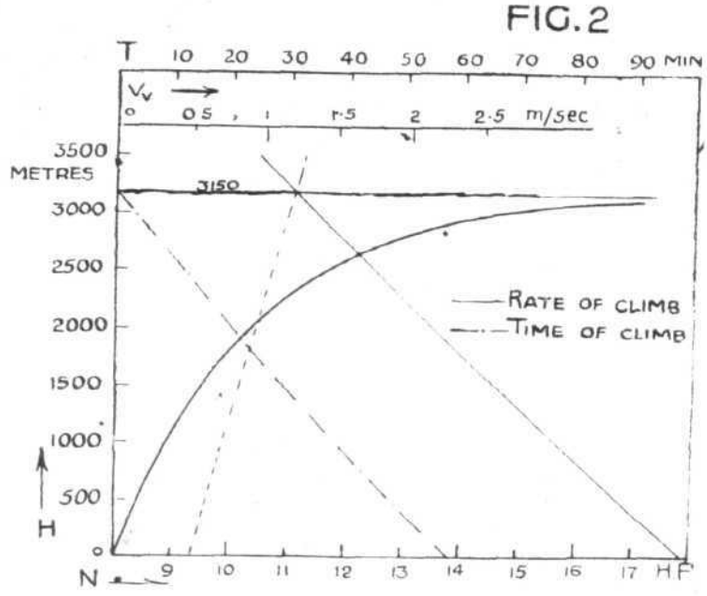


FIG. 2

Performance curves, etc., of the Pander light monoplane.

effected wherever possible, but neither enclosed undercarriage nor any other feature peculiar to "motor-assisted gliders" is to be found, and the machine is normal in every way.

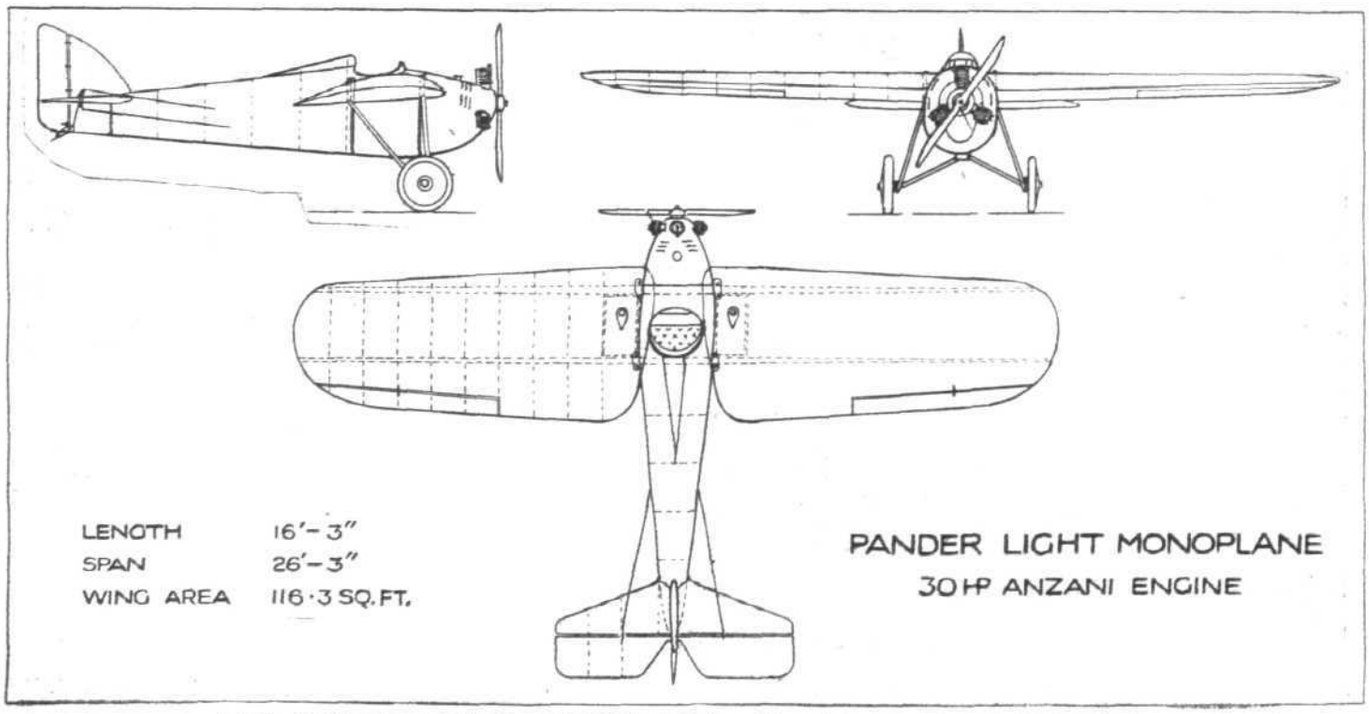
The construction is of interest, however, because of the painstaking care bestowed upon details, which has resulted, not in a cheap machine—for, as Mr. Pander very rightly claims, one cannot build a very cheap machine which is also very light—but a machine in which structure weight has been reduced to a very low figure indeed. The fuselage is a *monocoque* consisting of light longerons and hoops with a covering of three-ply wood. Actually the fuselage is flat-sided, but the turtle back and bottom fairings merge into it so gradually that one receives the impression that the section is elliptical. The ply-wood covering is exceptionally neatly applied, and in spite of its thinness shows no buckling. The hoops are of laminated construction, and several of them are spindled out for lightness.

The pilot's cockpit is placed between the wing spars, which rest on the top longerons, the curved coaming around the cockpit being put on after the wing is in place. Controls of the usual type are provided, except that in place of the usual rudder bar two tubular pedals with heel rests and toe guards are fitted. Thus in the small space available the angularity of a short rudder bar is avoided. A longitudinal rocking shaft carries cranks for the aileron controls, and a smaller tube runs from the joy-stick to a "bloater," from which wires run to the elevator. This tube is provided with a ball-and-socket joint at each end so that lateral movement of the control column does not interfere with the elevator control. The latter, incidentally, is operated by central cranks, the upper of which works inside the vertical fin and the lower inside the stern portion of the fuselage.

The monoplane wing is in one piece, and, as already mentioned, rests on the top longerons of the fuselage, each spar being secured by long "U-bolts" carrying yokes above the spar. The wing spars are of box section, with spruce flanges and three-ply walls. The front spar is of somewhat unusual arrangement and forms a box with the ply-wood covering of the leading edge. The curved wing tip is fairly thick, and is built up of a great number of laminations afterwards spindled out to approximately a semi-circular section. One of these wing tips was exhibited on the Pander stand at the Paris Show, and was surprisingly light, probably not more than 5 or 6 ozs. The tail is of similar construction to that of the wing, and is shown in one of the accompanying photographs.

The three-cylinder Y-type Anzani engine is neatly cowled in and drives a small tractor airscrew. Petrol is carried in two small tanks in the wing, one on each side of the fuselage, and supply the carburettor by gravity feed.

Streamline steel tubes form the members of the undercarriage, the two vees being hinged at the top to the sides of the fuselage, the load being distributed over a large area by steel bands running under the belly of the fuselage. The



THE PANDER LIGHT MONOPLANE: General arrangement drawings.

axles are hinged under the floor of the body, the hinges being covered with a streamline fairing. Rubber shock absorbers secure the outer axle ends to the angle of the vees.

The tail skid is mounted on and moves with the rudder, and is sprung by an enclosed coil spring. The whole fitting is shown in a photograph. The workmanship of the specimen exhibited at Paris was, as already stated, excellent, and if the same quality is maintained in the production machines there should be a ready sale for the Pander light monoplane, especially as we understand the price is very reasonable.

Following are the main characteristics of the Pander light monoplane: Length overall, 4·95 m. (16 ft. 3 in.); wing span, 8 m. (26 ft. 3 in.); wing area, 10·8 sq. m. (116·3 sq. ft.); weight of machine empty, 175 kgs. (385 lbs.); weight fully loaded, 280 kgs. (616 lbs.); top speed, 130 kms./h. (81 m.p.h.); landing speed, 40 kms./h. (25 m.p.h.). Power loading, 20·5 lbs./h.p.; wing loading, 5·3 lbs./sq. ft.

AIR CONTROVERSY IN THE U.S.A.

CABLES from America state that President Coolidge is generally believed to have adopted the view that defence funds can be spent more profitably on aircraft than on battleships. A movement is on foot for the establishment of a separate Air Force and Air Ministry in the United States. A Committee of the House of Representatives is inquiring into the state of flying in the country, and Brig.-General William Mitchell, Assistant Chief of the Army Air Force, in his evidence before it, is stated to have criticised his superior officers, while at the same time he has been advocating his own point of view in the public press. The Naval Air Service is also agitated, and in response the heads of the land army and the floating navy are full of indignation, and threatening disciplinary measures. It has been alleged that when the discarded battleship *Washington* was sunk, the tests were not impartial, but were so arranged as to display the superiority of naval guns over aerial bombs. Since the War, the Navy and Post Office have spent over £86,000,000 on flying, and the results are held to be unsatisfactory. There is, in fact, a pretty considerable storm in a very large teacup on the other side of the Atlantic.

FLIGHT, of course, does not presume to dictate to the United States how it ought to manage its own defence, spend its own money, and discipline its own officers. There can be nothing improper, however, in our stating our belief that a separate Air Ministry and Air Force is the wisest policy for any country to adopt; and if the United States decides to follow the example of Great Britain in that matter, we shall openly rejoice. At the same time, the discussion, so far as we are able to follow it from a distance, presents certain features which have an academic interest for us in Great Britain, because the United States, like the British Empire, when considering defence and not aggression, must think in terms of the ocean and not in terms of the land. Any conceivable attack upon either Power must cross the sea—either on it, or under it, or over it, or by a combination of these three. This consideration is what drives men to compare the merits of aircraft with the merits of battleships.

For the moment we decline to look into the future when the fighting unit may be a craft which performs the three functions of floating, diving, and flying. Sufficient for the day is the evil thereof. The question now is whether any useful lessons can be learnt by attempting to visualise a duel between battleships unsupported by aircraft on the one hand, and aircraft unsupported by battleships on the other. In the next war such duels may conceivably take place, but they will be extraordinary occurrences, and their results will not provide lessons of universal application. Such duels would resemble the favourite combats in the Roman arenas, when one gladiator equipped as a heavily-armed infantryman opposed a light skirmisher armed only with net and trident. The latter, one reads, almost invariably killed his opponent; but the Romans were not so unwise as to conclude that their legions had, therefore, ceased to be the main strength of Rome. The conditions were unnatural and unreal, and the fight taught no useful lessons.

The same air of unreality has surrounded such experiments as the periodical bombing from the air of the poor old *Agamemnon*. In the next war we must reasonably suppose that a battleship attacked by aircraft will likewise be defended by aircraft, as well as by anti-aircraft guns, and that, therefore, the upholders of battleships are also upholders of aircraft. We must remember also that various warlike arts are still in their infancy, and may be capable of extraordinary development. Notable among these are the arts of anti-aircraft fire, of aerial bombing, and of launching torpedoes from aircraft. We have no experience as yet which enables us to decide whether surface craft will be menaced most by bombs or by torpedoes from aircraft. Hitherto the bomb has not achieved a great reputation for accuracy of aim, even when the bombing aircraft have not been harassed by defending air fighters. Much was made at one time of the effectiveness of a bomb used as a depth charge to hole a ship from outside below the water line, because the *Ostfriesland* was sunk in that way. But Lord Lee of Fareham, then First Lord of the Admiralty, pointed out that it would take a bomb of 8,000 lbs., bursting 10 ft. from the side of the ship, to equal the effect of one torpedo in contact with the ship, while a 4,000 lb. bomb, exploding 30 yards away under water, would only equal 3 lbs. of explosive in actual contact.

The aircraft torpedo seems a much more formidable weapon, but it has yet to be tried out in war. The torpedo aircraft may find great difficulty in attaining position for effective discharge. The tactics, as displayed at the last Royal Air Force Pageant, consist in an advance flight paralysing the ship's defence, either by machine-gun fire or by spreading a smoke screen, while the torpedo carriers approach, flying low until they discharge their missiles. A counter smoke screen by the ships might upset the calculations, and, of course, the ship's 'planes might break up the attack. Nevertheless, a good many casualties to the aircraft would be amply repaid by the crippling of one battleship.

Another phase of tactics must be considered, that which will follow the advent of the airship cruiser. It may well be that in the next war even the United States will not be able to use helium in all the airships which will be commissioned, and for the purpose of this argument we may regard the airship as very vulnerable when attacked by aeroplanes, but not otherwise. The airships will be used as cruisers on trade routes and as fleet scouts. They will keep out of range of hostile aerodromes on shore, and therefore will only be in danger when hostile aircraft-carrier ships or hostile airships carrying aeroplanes in their slings get within range of them. To take the latter alternative first, the airships of both sides will carry aeroplanes, and the fight between the two will be on equal terms, with Providence presumably on the side of the big battalions. The combat between the airship and the aircraft carrier is more speculative and more interesting. Presumably, numbers (of aeroplanes) will be on the side of the surface craft, but the airship 'planes will have no undercarriages and will therefore be more formidable. In any case, it will obviously be desirable to prevent a hostile carrier from getting within range of one's own airships. Therefore, it remains as necessary as ever to rule the surface of the sea, as well as to rule the air. Can Britannia's old function be carried out by her aircraft carriers and her airships alone, or is the co-operation of a surface fleet necessary? If the latter, then Britannia, or Uncle Sam, as the case may be, must have battleships up to the one-Power standard. It is a question of defending one's own aircraft carriers and one's own airships.

All the cases considered above show great uncertainty as to the results of air tactics; and nothing is more uncertain than air defence. In fact, one may say it is certain that a line of defence can never be established in the air as it can be established by land and by sea. If the hostile bases are in position, the hostile aeroplanes will be able to take to the air. We repeat that the surface of the sea must be kept safe for one's own carriers and must be forbidden to the hostile carriers. To attempt such a task without the aid of a superior battle fleet would be leaving a very great deal too much to chance.

The Gloucestershire Aircraft and Engineering Society

THE Gloucestershire Aircraft Co., Ltd., of Cheltenham, tell us that they have formed an Aircraft and Engineering Society, together with a Model Club. The Hon. Secretary is Mr. A. A. Bage. This is an example that might with advantage be followed by many other aircraft firms.

AIRCRAFT MAKE GOOD IN CANADA

WE have, from time to time, made brief reference in FLIGHT to the work done by aircraft in Canada, from which it will have been gathered that, thanks mainly to the energy of the Royal Canadian Air Force, Canada has been determined to make aviation in that country—as far as financial resources will allow—a practical proposition. Although in comparison to the vast size of Canada, aerial activity is not of very extensive proportions, the work accomplished so far has been of considerable importance and undoubtedly of great service to the country.

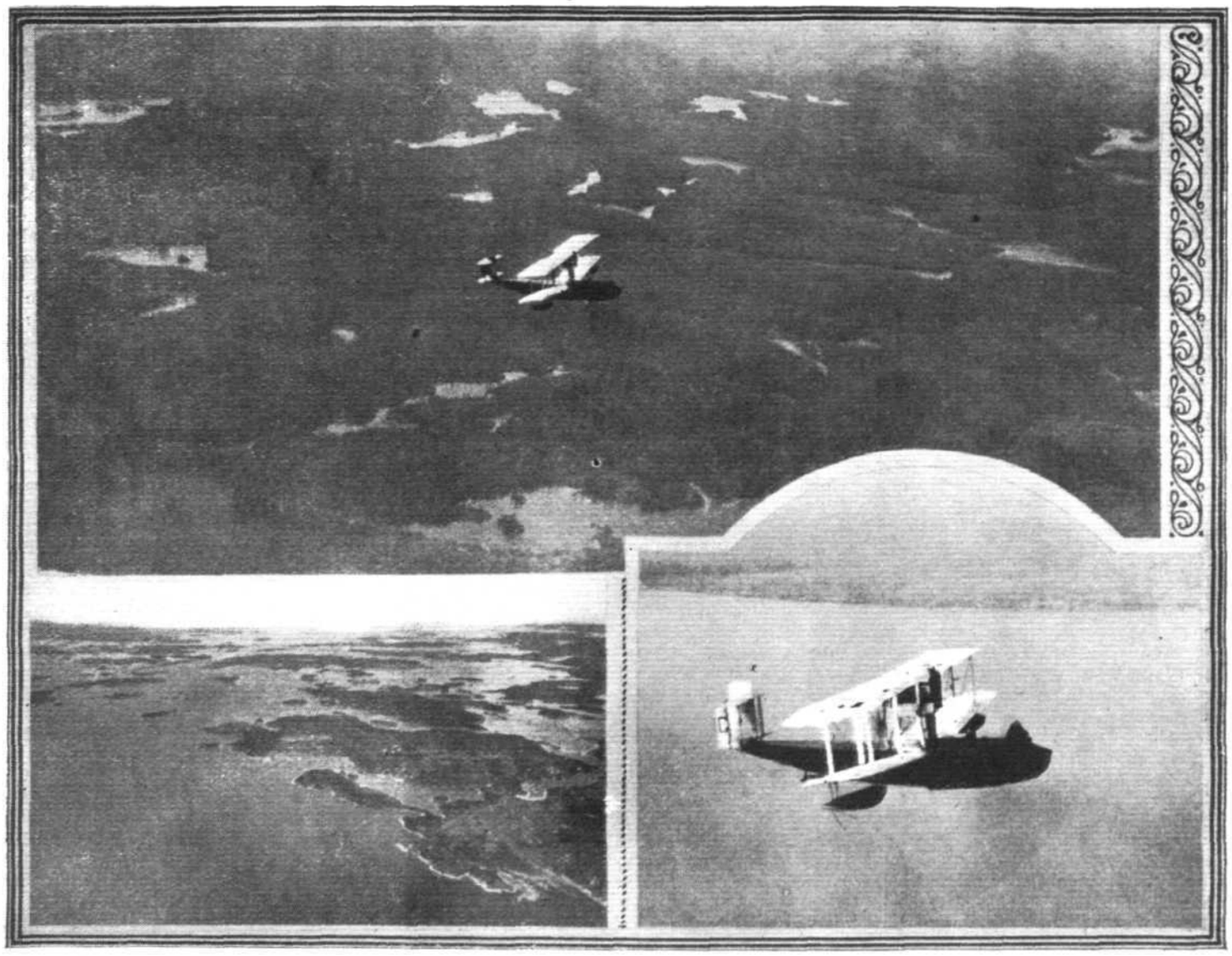
The Royal Canadian Air Force, as far as the civil side of aviation is concerned, appears to work hand in hand with the few civilian aviation concerns that exist in Canada —such as the Laurentide Air Service, Ltd., the Fairchild Aerial Survey Co. (Canada), Ltd., etc., and on several occasions big schemes involving aerial transport or surveying have been carried out by such companies in co-operation with the R.C.A.F.

Perhaps the two most important spheres of aerial activity in Canada may be said to consist of forest patrols and topographical survey work. With regard to the first, much valuable work has been—and is being—done, many millions of acres of forest land having been patrolled and fires detected, and even suppressed.

Aerial survey work—which is still in progress—has also been successful. In this connection, we think the following report on the subject, which appears in *Natural Resources of Canada*, may be of interest. The report refers to a recent flight made by a member of the staff of the Topographical Survey of Canada, Department of the Interior, from Victoria Beach, Manitoba, through Northern Manitoba and Saskatchewan. The operations were carried out in co-operation with the Royal Canadian Air Force, and during the flight, which covered approximately 2,810 miles, over 1,700 photographs were taken. Ground traverse work was also conducted by the Topographical Survey, and upon the completion of the latter it will be possible to plot an area of about 15,000 square miles. The flight occupied nearly four weeks, but owing to unfavourable weather conditions only 44 hours and 10 mins. of actual flying was done.

The flight represents one of the most brilliant achievements in the history of aviation, and reflects considerable credit upon the officers of the Air Force who were responsible for keeping the 'plane in good operating condition. The distance travelled and the area photographed demonstrates clearly that in no other way can the surveyor hope to cover unmapped and remote territory with such ease and rapidity. The visibility on a clear day is so good that well-defined points, such as prominent headlands, or fairly large bodies of open water, can be readily distinguished at a distance of 40 miles or more from an elevation of 5,000 ft. It is just here that the air traveller gets one of his greatest advantages over the man on the ground. The latter cannot jump from one easily identified point to the next, often many miles distant, but must follow the water course in all its intricate details.

The difficulties confronting the Topographical Survey of Canada in mapping large areas in Northern Canada are well known. The demands for better maps for settlement, mining and forestry purposes are constantly growing. The slow progress of surveys by ground methods, with what might be termed their incomplete results, made experiments in aerial photography advisable, and, in co-operation with the Royal Canadian Air Force, efforts were made to deter-



AERIAL ACTIVITY IN CANADA: The top view shows the Vickers "Viking" amphibian operated by the Laurentide Air Service, Ltd., of Montreal, flying over the Rouyn Gold Field district. Below, on the left, is an aerial view of typical country (in Reindeer Lake district) recently surveyed for map production by the Royal Canadian Air Force. On the right is another view of the Vickers "Viking," which was also used by the Fairchild Aerial Survey Co. (Canada) for aerial photographic operations.

mine whether methods of aerial survey could be evolved which would give greater speed, with less work and more complete results. With this in view, in the fall of 1923, a small area north of The Pas, Manitoba, comprising part of the Kississing sheet of the Sectional Map of Canada, was photographed by methods laid down by the Topographical Survey. The test showed that providing oblique photographs could be taken under satisfactory light conditions, at definite angles, with proper intervals, and at known heights, a reliable map could be produced which, with a minimum of ground work to control the pictures, would be more complete and accurate than any ground survey which could be contemplated in that area for many years. The field work, moreover, could be completed in a few weeks as against many months of hard travel by canoe.

The present flight started on July 18 from Victoria Beach and four hours later the 'plane reached The Pas from which point the actual photographic work was begun. Fuel for the operation of the machine had been shipped to several points during the winter months, and since the total allowable load was 5,600 lb. and the combined weight of the pilot, engineer, photographer, and navigator, and the camera, equipment, and supplies was 5,863, it was found necessary to begin the flight without the aeroplane's wheels and tail-skid. Weather conditions interfered, and it was not until July 20 that photographic work was started 25 miles north of The Pas. Pukkatawagan was reached the same day, and a start for Rabbit River was made on the 23rd. The machine operated on Reindeer Lake until August 1, with Rabbit River as the base. Surveyors running the ground traverse from which the photographs will be plotted were met in the Reindeer Lake district, and were given some very useful information about the country. The party left Rabbit River for Stanley Mission, but, owing to unfavourable photographic weather encountered, the course was changed to Pelican Narrows, from which point a report was forwarded to the head office at Ottawa. They resumed flight on August 11 from Ile-a-la-Crosse, later continuing on to Prince Albert. The following day they left for The Pas, and on August 14 reached Victoria Beach.

Aerial operations were also conducted during the year in other parts of Canada where mapping operations were under way and where the forest and mineral resources were being investigated. This particular flight and the ground surveys with which it was connected were for the purpose of preparing a base map for geological investigations of northern Saskatchewan. Upon the completion of the map the photographs will be available for the use of the geologist, the forester and the water-power engineer for study and use during actual ground investigation. The aerial surveys being performed by the Topographical Survey, therefore, have a twofold value, the first mapping and the second providing actual photographs for study and investigation by experts engaged in developing Canada's natural resources.

During the flight food, of which there was no shortage, consisted mostly of bacon and canned goods, with bannock to replace bread. There was little meat available, but plenty of fish. Moose meat was extremely scarce. The residents attribute this to the absence of flies in the north country this year, consequently the moose were not driven to the water, as in other seasons. Since the Indian does not leave his canoe, but always hunts by paddling up the waterways, very little meat was obtained. The large herds, numbering thousands, of caribou and reindeer which move about in the district during the winter had all moved north to their summer grazing grounds in the " barren lands " by the time of the party's arrival.

As previously reported in " FLIGHT," further survey work is being carried out this year. With regard to other air work in Canada, the air transport services operated by the Laurentide Co. in the Rouyn Gold Field District have, we believe, proved very successful, and have been well patronised both as regards passengers and mails.

In short, it may be said of air work in Canada that—as the famous comedian said of his salary—while there is not much of it, what there is, is good.

AIR MINISTRY NOTICES

GROUND ENGINEERS

D.H.4, D.H.9 and D.H.9a Types of Aircraft : Construction of Main 'Plane Spars

1. THE attention of ground engineers is directed to the necessity for observing the following inspectional precautions during overhaul of the main 'planes fitted to the above types of aircraft.

2. Each spar should be carefully examined for general quality of the timber, which must be one of the following :— Sitka spruce, West Virginia spruce or Oregon pine.

3. In addition the type of spar construction must be specially noted to ensure its being one, or other, of the following :—

(*a*) Vertically laminated spars containing two or three laminations either continuous or with one lamination spliced ; spliced as for a solid spar ; having a half spar of two laminations spliced to a half spar of three laminations ; or having a solid half spar spliced to one of two or three laminations.

(*b*) Horizontally laminated spars containing laminations with butt joints in the inner laminations, but with the top and bottom laminations continuous, or containing continuous laminations throughout.

(*c*) Box spars with continuous or jointed flanges and sides. These spars are entirely covered with glued-on fabric which renders inspection difficult. This fabric or taping should be examined for discoloration which reveals the presence of moisture. If such discoloration be present the entire spar should be unwrapped, as in all probability failure of the glued joints may have occurred. If, on the other hand, no defects are visible stripping of the fabric need not be made, but a careful examination of the fabric wrapping must be made for any signs of shakes or of broken joints.

4. All box spars must be provided with $\frac{1}{8}$-in. inspection holes indicating the positions of the internal packing blocks. If no such holes are present, $\frac{1}{8}$-in. holes must be drilled on one vertical face of each spar on the neutral axis close up to and verifying the correct positions of both ends of each packing block.

5. Splices must be carefully examined for soundness. The only approved types of splices are the plain scarf and the R.A.E. type, the latter taking the form of a dovetail splice with a central square wedge. The " bird's mouth " type of splice is not permitted.

6. In the event of new spars being required these must be made in accordance with the following drawings :—

SPARS

De Havilland 9*a*

	Solid Spliced.	Horizontally Laminated.	Vertically Laminated.	Box.
R. and L. hand top and bottom :				
Front ..	13803	15869	17197	16086
Rear ..	13804	15870	17198	16063

De Havilland 9 *and* 4

	Solid.	Solid. Spliced.	Horizontally Laminated.	Box (Built up).
R. and L. hand top and bottom :				
Front ..	6694	10633	16867	A.D. 1415
Rear ..	6695	10632	16866	A.D. 1416

(Copies of these drawings when necessary may be obtained on application from the Secretary (R.D. 3), Air Ministry, Kingsway, W.C. 2, on pre-payment.)

7. No certificate of airworthiness will be issued or renewed in respect of any aircraft of the above types, constructed or overhauled subsequent to the date of issue of this Notice unless the above precautions have been observed.

(No. 1 of 1925.)

" Petroflex " Tubing

IT is notified that the use of internally unarmoured " Petroflex " tubing in aircraft shall be discontinued forthwith.

No certificate of airworthiness will be issued or renewed in respect of any aircraft on which the above instruction has not been carried into effect.

(No. 2 of 1925.)

LIGHT 'PLANE AND GLIDER NOTES

WORK is progressing on the new De Havilland two-seater low-power biplane, the D.H.60 "Moth," at Stag Lane. The "Cirrus" engine has, we learn, been installed in the fuselage, and the machine itself is expected to be completed in about a fortnight. As the "Moth" marks an intermediate step between what has hitherto been regarded as a light 'plane and the usual training machine, its performance will be watched with more than ordinary interest. The "Cirrus" engine, which is being produced by the Aircraft Disposal Company at their Waddon works, is, we are told, passing through its bench tests with flying colours, and there is every reason to expect that it will perform equally well when mounted in the machine and flying. The "Cirrus," it will be remembered, was originally conceived by Capt. Geoffrey de Havilland, and the design and development work carried out by Major Halford, of B.H.P. fame. Sturdy construction and absolute reliability are the features aimed at, so that it is hoped the engine will require no more attention than the engine of a motor-car. We hope shortly to publish a detailed illustrated description of the engine in FLIGHT.

* * *

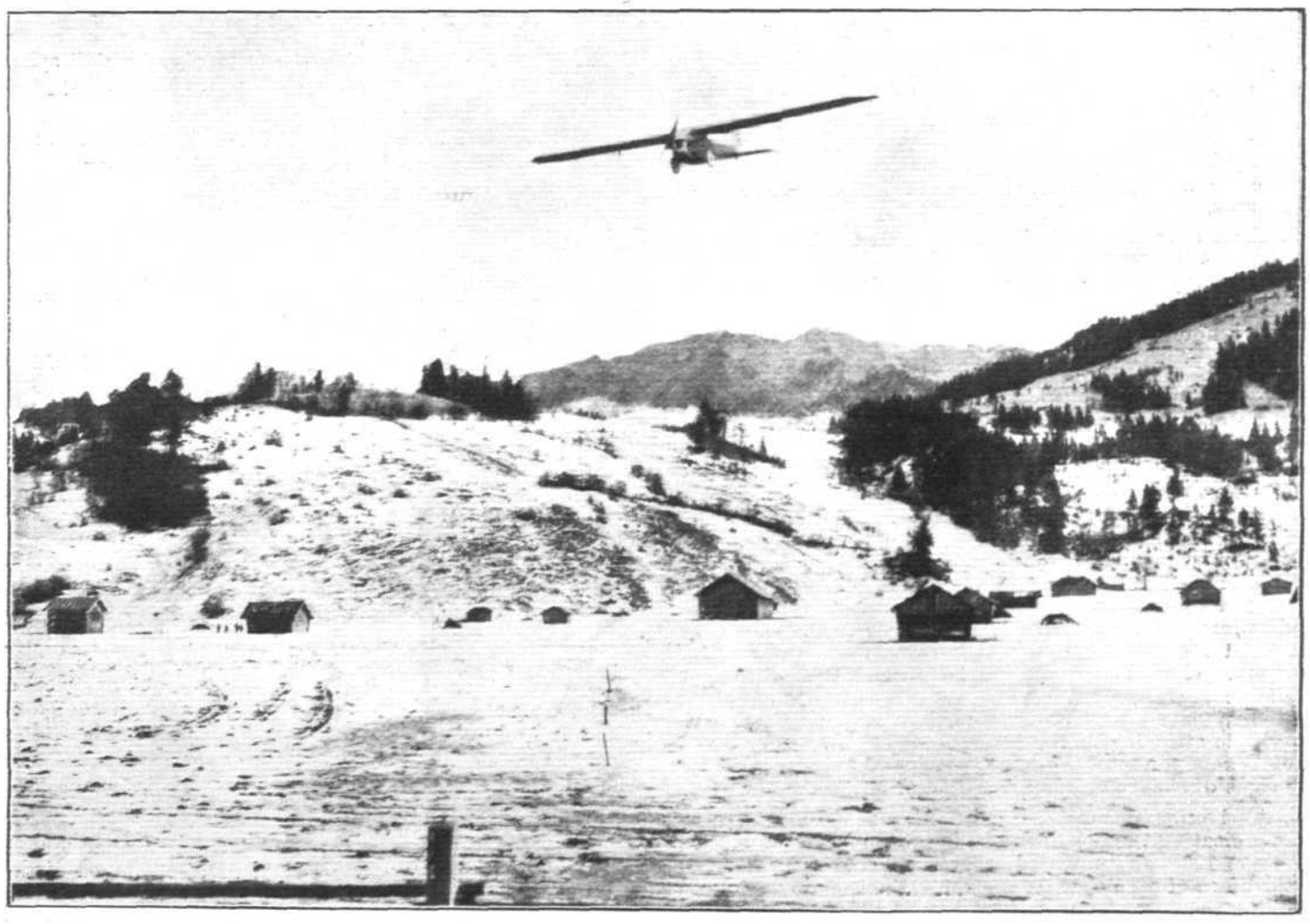
AN example that might be followed with advantage in this country was the *Zugspitzenflug* held in Germany recently, in which a German Spa, Garmisch-Partenkirchen, offered substantial prizes for a flight around the Zugspitze, a mountain in the Bavarian Alps, which reaches an altitude of 2,968 m. (9,740 ft.). Machines were required, for the Zugspitzenflug to fly to a formula, marks being awarded according to the value of the ratio $\frac{\text{useful load}}{\text{fuel consumed}}$. Thirteen machines had been entered, of which 12 started and 11 completed the flight. On the formula basis highest marks were awarded to Botsch on the Bahnbedarf B.A.G. E.1, a light monoplane illustrated in FLIGHT a few months ago. There is considerable satisfaction, from our point of view, in the fact that the Bahnbedarf machine was fitted with a British Blackburne "Tomtit" engine, similar to those used in the famous D.H.53 light 'planes. The "Tomtit" was mounted in an inverted position, much after the fashion of the single-seater A.N.E.C. monoplane of the 1923 Lympne competitions.

* * *

ON the day of the flight thick fog obscured the ground and extended to the top of the mountains, but later in the day a fresh wind sprang up and cleared the fog away, and it was decided to make a start. The very gusty nature of the wind compelled most of the competitors to fly high, and Botsch even reached an altitude of 3,400 m. (11,160 ft.), or 1,420 ft. above the summit of the Zugspitze. Another pilot, Croneiss, took his instructions to round the Munich Hotel on the top too literally, and was caught in a down-current and blown against the snow-covered mountain, fortunately without sustaining injury. Apart from the flight around the Zugspitze, there were demonstrations of stunt flying, balloon sniping competitions, etc., and several flights were made on gliders, none, however, of very long duration. Fuchs on the "Dessauer" made two flights of 3 mins. 48 secs. and 4 mins. 28 secs. duration respectively. Rolf Hirth kept the "Rotem Teufel" in the air for 2½ mins., and Papenmeyer took up the famous "Greif," but came to grief in landing.

* * *

THE start was made from Schleissheim, a short distance north of Munich, and competitors had to fly around the Munich House Hotel on the summit of the Zugspitze and return and alight on the aerodrome near the railway station of Garmisch-Partenkirchen. The distance is something like 75 miles, and was covered by Botsch in 2 hrs. 21 mins. The fastest machine, a Junkers type F, piloted by Doldi, covered the distance in 1 hr. 17 mins. 12 secs., but owing to the fact that machines were flying to a formula Botsch, who actually was the slowest, won first prize. Considering that a head wind was encountered the Bahnbedarf machine must be said to have made pretty good time, with approximately 32 m.p.h. against a very strong wind, and having at the same time to climb to an altitude of more than 11,000 ft.



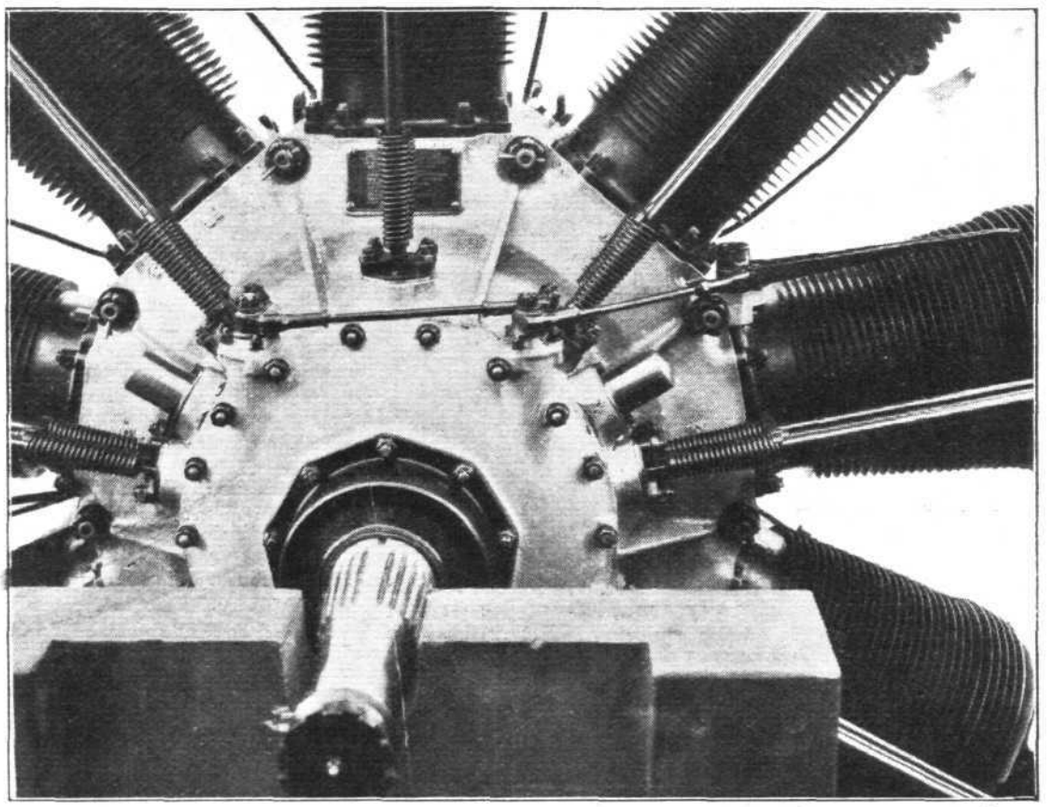
WINNER OF THE ZUGSPITZ FLUG: Herr Botsch on the Darmstadt Bahnbedarf E.1, with Blackburne "Tomtit" engine *en route* to the Zugspitze.

FLIGHT
THE AIRCRAFT ENGINEER AND AIRSHIPS

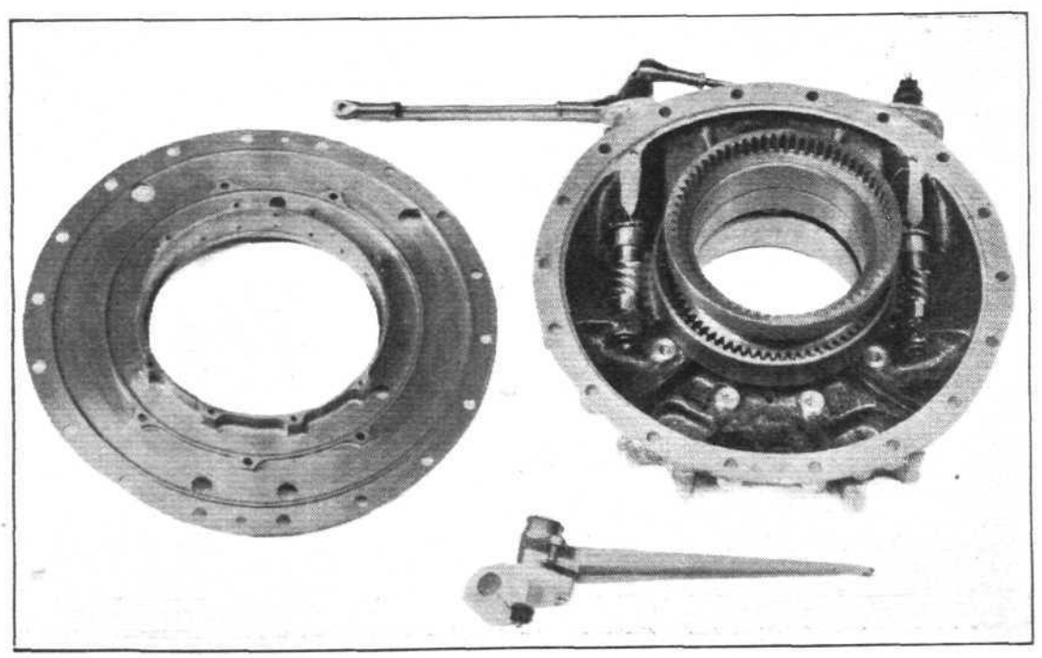
INCREASING AERO-ENGINE POWER AT ALTITUDE

Bristol "Jupiter" Variable-Timing Gear

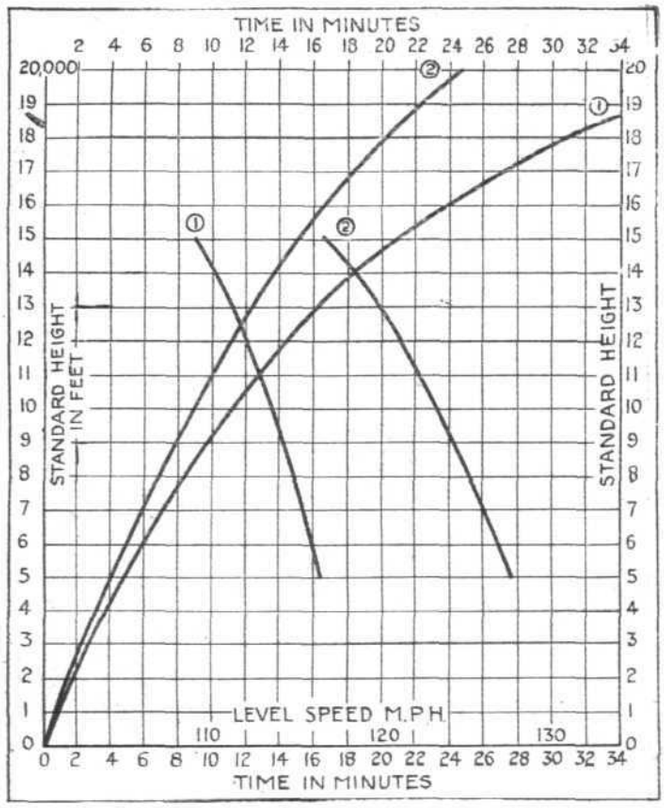
THE possibility of increasing the performance of an aero engine at altitude by using a variable-timing gear, which can be worked by the pilot as the machine ascends, has been realised for some time. Towards the end of the War, when greater performance at altitude was urgently needed, a scheme was put forward by Mr. Ricardo. He pointed out that by using a variable timing gear in conjunction with a high compression ratio and employing the simple expedient of closing the inlet valve late, so that compression would not start until well up the compression stroke when near ground level, then the timing could be gradually advanced by the pilot, until at a predetermined altitude normal timing could be employed. By this means ground level power would be obtained up to the height at which the normal timing could be employed. From this height onwards, the horse-power of the engine would, of course, fall off, as with normal compression ratio engines, but there would be a considerable increase of horse-power available at all altitudes, and a marked fuel economy. This scheme for increasing the engine performance at altitude is far preferable to an over-size high-compression throttled engine, insomuch as with the former certain definite advantages are secured, such as a rising torque curve, a short compression and long expansion stroke, with no chance of pre-ignition and detonation, etc. Owing to difficulties on



The Bristol Variable Timing Gear: Front of the "Jupiter" showing the simple levers by means of which the gear is operated.



Details of the Bristol variable timing gear.



THE BRISTOL VARIABLE TIMING GEAR: The curves show comparative performances of the Bristol "Bloodhound" with same all-up weight and same propeller, curves 1 relating to the standard "Jupiter" series IV engine, and curves 2 to the "Jupiter" IV with variable timing gear and Triplex carburettors. It will be seen that the performance, *i.e.* both speed and climb, is greatly improved.

existing conventional "in-line" engines, however, this simple method of increasing power at altitude was never developed.

On the Bristol "Jupiter" radial air-cooled engine it has been possible to obtain a practical solution of the variable-timing engine; firstly, owing to the patented double-epicyclic timing gear, it is quite simple to arrange that the period of opening the valves can be easily changed while the engine is running, and also owing to the stroke-bore ratio of the engine, viz., 1·3 to 1, it has been possible to re-design the cylinder with 6·3 to 1 compression ratio without obtaining an inefficient combustion chamber.

The Bristol Aeroplane Co., Ltd., have been working on this development for the last nine months, and have now obtained most excellent results both on the bench and in the air, as we recorded in one of our Paris Show articles dealing with the "Jupiter" exhibited there.

From the illustration given of the gear as mounted on the nose of the "Jupiter" engine, it will be noted that it is quite simple. There is a double-worm gear controlling the stationary annulus of the timing gear. No moving parts of the engine are affected, so that the reliability of the engine is not detracted from in the least, and the additional weight to the engine is only 4 lbs.

On the test bench, with the variable timing retarded, it was found that the engine maintained ground-level power at normal consumption, and that the gear could be operated quite satisfactorily throughout its whole range with a very slight effort. This engine was then mounted in the Bristol "Bloodhound," a two-seater fighter, with which very careful performance tests had previously been made when fitted with a standard "Jupiter" engine. This machine has now been flying for the past three months, during which period an extended series of tests have been carried out by the Bristol Company's chief test pilot. The results show a marked increase in performance between the aircraft when fitted with the standard Series IV "Jupiter" engine, with 5 to 1 compression ratio, and when fitted with the engine with the variable-timing gear. Throughout the tests the same pilot, same weight, and same propeller were used, and all figures have been carefully corrected, so the results are strictly comparative.

The accompanying chart shows the difference in climb and speed of the machine with the standard engine, and with the variable-timing engine. It will be noted that on a climb to 18,000 ft., the time is reduced by 11 minutes by the use of the variable-timing engine, and at 15,000 ft. the increase in speed is 8 m.p.h.

The addition of the variable-timing gear, for which a patent has been applied for, has thus proved a simple and practical method of considerably improving aeroplane performance at altitudes, without adding any appreciable weight, increasing head resistance, or detracting in the slightest degree from the engine reliability.

◈ ◈

Sir Sefton Brancker Flying Home

SIR SEFTON BRANCKER, Director of Civil Aviation, who arrived at Calcutta on February 9 in the D.H. 50 piloted by Alan Cobham *en route* for England, proceeded on February 13 for Benares. Delhi was reached in the evening of February 15.

French Saharan Flight Disaster

THE De Goys aerial mission to Lake Chad and Bangi, which had successfully reached Niamey, on the Niger—2,750 miles from Paris—met with disaster when resuming the flight on February 11, in consequence of which the French Under-Secretary for Air, M. Laurent Eynac, has ordered the flight to be abandoned. One of the four-engined Blériots, "Jean Casale," piloted by Col. Vuillemin, was just leaving the ground when it suddenly rose at a steep angle, stalled and then crashed to the ground. Col. Vuillemin was seriously injured, and the mechanic, Serj. Knecht, was also very badly hurt, but the wireless operator, Serg. Vendelle, was killed. Capt. Dagneaux, the navigator, was less seriously injured, and is reported to be doing well. The cause of the accident is stated to be due to an incorrect setting of the tail plane. Capt. Pelletier d'Oisy, the pilot of the second Blériot, has been instructed to return to Dakar.

On behalf of Great Britain, Sir Samuel Hoare, Secretary of State for Air, sent telegrams to the French Minister of War and Air Minister, expressing regret at the disaster to the "Jean Casale."

Madrid-Las Palmas Air Mail

ACCORDING to *The Times* correspondent, a Royal Decree authorises the Director-General of Communications, a branch of the Ministry of the Interior, to issue, after consultation with the Council of State, a call for tenders from Spanish companies for the establishment of an aerial postal service between Seville and the Canary Islands. A concession for ten years, renewable for a similar period, will be granted to the selected company. The service is to consist at first of one journey both ways each week, to be increased according to the requirements of the traffic. The aeroplanes must have at least two engines and be fitted with wireless apparatus. The minimum speed is to be 85 miles an hour, the radius of action six hours, and the carrying capacity for mails 1,320 lbs. The flight will be in five stages: Seville-Laraiche, 91 miles; Laraiche-Mogador or Agadir, about 210 miles; Mogador or Agadir to Cape Juby, 226 miles; Cape Juby-Las Palmas and Las Palmas-Teneriffe, 31 miles. Although during the last three years concessions for air lines have been granted all over the Peninsula, the only concession which has, so far, materialised under Spanish enterprise has been the Seville-Laraiche service, which employs British machines and pilots. It is calculated that, unless the official bodies which have been asked to report on the new proposed line show most unusual activity, about one year must elapse before the line will be open for use.

◈ ◈

French Parachute Disaster

A TERRIBLE accident occurred at Villacoublay last week, when A. Ruppert set out on a Liore et Olivier monoplane for an attempt to beat the world's height record. When at about 2,000 ft. one of the wings of his machine gave way, and as the machine dived to earth the pilot was seen to jump with his parachute. The latter, however, failed to function, and the pilot fell straight to the ground and was instantly killed.

The Royal Infant Orphanage

THE half-yearly election for the admission of fatherless children to the Royal Infant Orphanage, Wanstead, E. 11, will be held in May next. Children are received from birth up to seven years of age and maintained and educated until sixteen. Application should be made as early as possible to the Secretary at the Orphanage, Wanstead, London, E. 11.

FLIGHT
AIRCRAFT ENGINEER AND AIRSHIP

THE OPERATION OF FLYING BOATS IN THE MEDITERRANEAN

THE paper read by Air Commodore C. R. Samson before the Royal Aeronautical Society on February 5 was one of uncommon interest, and we should have liked to publish it in full. This, however, is not possible owing to lack of space, but we have thought it essential to give in full the conclusions to which Air Commodore Samson has come as a result of his very extensive experience of seaplanes and flying boats and their handling and operation under the conditions prevailing in the Mediterranean.

The lecturer gave particulars of altogether 21 flights, with a total flying time of 238 hours, the total "casualties" of which were one F. 2A lost, one Fairey wing damaged, and back-axle and two after port undercarriage struts broken. The account of these flights is full of valuable and interesting information, and we would advise readers to obtain a copy of the society's Journal, in which the paper will be published in full.

Following are the conclusions at which Air Commodore Samson has arrived :—

Refueling Methods

On practically every occasion petrol was brought over to the "F.2 A.'s" in small boats, generally in 50-gallon drums or 12-gallon tins. It was soon found that the best method was to empty the petrol into 4-gallon tins in the boat and then put it into the tanks. The 50-gallon drums were impossible to handle on board an "F.2 A.," and the 12-gallon tins also being heavy and awkward to handle, in addition, we used to waste a lot of petrol. Another advantage of decanting the fuel into 4-gallon tins was that we got it doubly strained, a fully necessary precaution, as some of the fuel we got was very dirty and had a lot of water in it.

We had a large petrol funnel which we could hang up by the aid of two slings to the upper plane, thus saving the use of a man who had to hold it up before some bright fellow designed the slings.

The tanks should have gauges that can be read from on deck. The "F.2 A." gauges were very bad, and time after time one man would have to go below to see how the level stood.

The chamois leather had to be frequently removed from the funnel and cleaned. A ready attachment to the funnel in the shape of a band is required. The funnel itself should have a wind shield, as otherwise so much petrol is wasted when refuelling in any wind. We had long lengths of rubber hose so that we could reach each tank. Towards the end we used a two-legged funnel so that two tanks could be filled at once. We often considered using a pump; but finally decided that, however big the tank was, the 4-gallon tin was the most reliable and least complicated. We always carried at least eight 4-gallon tins.

Whilst on the fuel question, I would like to add that it is most essential to have some rapid method of discharging petrol overboard out of the tank, whatever type your flying boat may be, as circumstances arise when you cannot get off with a heavy load.

Pumping Out Arrangements

Wooden hulls, however well built, will leak, especially so in hot climates. The same should not occur so frequently in the case of metal hulls, but it is certain that a certain amount will happen. It is very essential to have some reliable and quick method of dealing with water in the hull. The "F.2 A.'s" had a semi-rotary pump with leads into the various compartments. I soon found that it was practically useless owing to the leads getting choked up and the pump getting blocked. The pump was also awkward and tiring to manipulate; we tried many schemes, but finally decided that a large garden syringe was the best, aided by a 4-gallon tin sawn in half. In the case of big boats a pump that could be either power or hand worked is very essential.

Lighting Arrangements

Whatever the size of the boat, electric light installation is required. Riding lights, internal illumination, inspection lamps, signalling lights are all required.

In the case of small boats a dynamo and accumulators will probably suffice; but in the case of large boats an auxiliary engine is, in my opinion, absolutely essential. This engine will be able to deal with :—(1) W.T. whilst at rest; (2) electric lighting; (3) pumping; (4) cooking; (5) charging batteries; (6) anchor work; (7) it might also deal with slow taxying.

Cooking Arrangements

It is absolutely essential that some method of cooking food both whilst in flight and at rest is provided. Electric cooking is far and away the best method for reasons that are obvious. If a good electric cooker is installed it would do all sorts of jobs besides preparing food, one of which is drying clothes. You frequently get wet through whilst living in a flying boat. If you have some method of drying your clothes, you score tremendously; electric radiators are, I consider, a necessity not only for this, but for heating the sleeping quarters.

This may seem a great elaboration, but only those who have had to sleep in a boat after and before an eight hours' flight know what a boon it would be.

Mooring-up Arrangements

Firstly, you should have efficient ground tackle. Your anchor or anchors should be capable of holding the boat on an average bottom. The anchor should be easy of stowage and as small in dimensions as possible. There is one slight difficulty that may have to be dealt with: that is, if you have one or two heavy anchors stowed forward you may upset the trim of the boat in the air; therefore, your stowage place should be further aft. This could be easily arranged for. The cable should be preferably wire, with the last two fathoms at the anchor end chain. The wire cable should be stowed on a reel, and the reel should be either hand or power worked. Personally, I would carry two bower anchors of stockless type and one kedge anchor stowed aft. This is very useful for warping purposes. The cable of the kedge could be made of hemp. In addition to your anchor, you require at least three mooring ropes, hemp for preference, for (1) picking up buoys, (2) use as slip rope, (3) stern moorings when lying in a fairway and you do not want to swing, (4) mooring up to jetties, etc., (5) towing by motor-boats.

If you moor up to a buoy your main anchor cables would be unshackled and used as mooring ropes. In the extreme bows of the boat you should have a place where the crew can pick up a buoy or pick up a tow, work boathooks, etc. There should be plenty of room with the body exposed from the waist upwards, and a solid foothold. Outside this there should be a walk where they stand, if required to jump off on to a buoy or jetty. In the cockpit, or whatever you like to call it, there should be at least one good bollard with a belaying pin and a good cleat on each side.

In a rack or clips should be stowed a picking-up hook consisting of a light boathook fitted with a spring hook to which is attached a light line—this line should be run through a fairlead on the hook so that a heavier line could be hauled out to the buoy. The boathook need only be about 12 ft. long, and it might be made collapsible for easy stowage. Whilst on this subject I would say always have the inboard end of any line made fast. How often have I seen boats adrift because the crew have omitted this.

However big the boat it should be able to pick up its own buoy or to go to jetty under its own power, whether main or auxiliary power plant.

However experienced the crew there are occasions on which you bump your objective, therefore a fender is essential. After a little experience we always carried one, and it saved us many a stove-in plank. I can by now see that many of the audience are thinking how the devil will a boat get into the air with all this junk. We used to, and with old soggy boats of antique design—and you cannot do without it. If each article is properly designed you will find that you can still fly. I would lay down that in the design of any flying boat they should fix the position of all these essentials and allow for them, just the same as in a single-seater fighter you fix the gun positions, although there have been instances I have encountered recently where guns are fixed firing directly into the engine. I don't know personally whether this is being done at present, but hope that it is. In every design of flying boats somebody with real practical experience of their manipulation whilst on a cruise should be consulted—otherwise you get a regular Christmas tree and end up by carrying twice the weight in extras that you would have done if they had been properly designed. I would most strongly impress upon you that the flying boat will never fly more than once or twice unless its existence on the water is as carefully considered as its existence in the air.

The use of drogues is required on all occasions of picking

up moorings, manœuvring in restricted spaces, warming up engines, riding out at sea, etc., etc. The drogues should be capable of being split and opened by the manipulator at will. They are worked from each quarter and a cleat should be fixed for the lines in a handy position. If you have to lie at moorings during strong winds, you should be able to weight your boat down with water by taking in water ballast in the hull. This will prevent you flying at your moorings. If you have wing tip floats I would like them made so that you could weight them down with water ballast.

Internal Design of the Boat

First and foremost, there should be a good passage way all along the hull. The interior should be light and well ventilated. The pilot if he turns round should be able to see the members of his crew.

W.T. compartment should be directly behind the first pilot.

All the crew should be able to look out, apertures being made in the hull close to their stations. The hull should be made so that the crew can walk along outside or over the top.

Every cockpit or aperture should have a cover to it, especially so the front cockpit, which should have a sliding watertight cover. The pilot's wind screen should have an electric wiper.

The petrol tanks should be so constructed that they can be placed at the sides of the hull or under the deck.

Engines should be so mounted that they can be removed by the crew without dismounting the planes. The engines should be accessible to the engineer during flight. Exposed lengths of petrol and oil piping are a nuisance as well as being a source of trouble.

The propellers should be so placed that they are out of the way of the water thrown by up the hull, also well clear of the water. This may be difficult to accomplish.

The step or steps should, if possible be adjustable. This may be impossible; but it would be invaluable on occasions.

The design that appeals to me is one that permits of the engine being in the hull itself under cover, with propellers driven by shafts through gearing.

A gravity feed to the carburettor is also desirable with main tanks, either in the hull or, if not desirable to do this, placed in the wings. If possible, do away with wing tip floats; they are always a source of trouble and danger. A pathway along the planes is essential, also one overall to the tail.

Good watertight sub-division of the hull is necessary, the bulkheads being carried above the waterline.

Cupboards should be provided for:—(1) Tools; (2) accumulators; (3) cooking and eating utensils; (4) clothing; (5) stores; (6) spare parts; (7) charts, instruments, navigational books, etc.

This can easily be done without much additional weight, and certainly in some cases at a great saving of weight. A light cupboard for your clothes, for instance, is much lighter than using a suitcase, also clothes can be kept dry. These cupboards also obviate gear sculling about all over the place.

Sleeping Accommodation

Light bunks as we made in the Mediterranean were a godsend. They only weighed about 12 lbs., and were hinged up against the sides of the boat when not in use. Each bunk had a sleeping bag attached, this bag being made of aeroplane fabric. Aquilla's tail was a sight for foreigners to be shown. We had two bunks, electric light, electric fan, and photographs stuck up on the sides. It made good propaganda. It was quite comfortable except for Carnegie's snoring.

◈ ◈ ◈ ◈

ROYAL AERONAUTICAL SOCIETY

(Official Notices)

Election of Members.—The following Members have recently been elected:—

Fellow: Major J. C. Stewart.

Associate Fellows: R. V. de Aboim, K. W. Berger, E. C. Gibbons, J. D. Haddon, Major H. Hemming, F. A. Kerry, G. Lyon, J. S. L. Oswald, C. A. Pike, C. J. Sanders, Major G. H. Scott, C.B.E., A.F.C., Professor O. S. Sinnatt, S. O. Smith, C. A. Wright.

Students: J. W. H. Barrett, J. E. Bell, W. A. Crabbs, J. C. Dodds, F. G. Evans, W. G. Kimber, I. Levy, M. A. Maude, G. S. Mills, R. L. Mills, A. J. Newport, R. S. Stafford.

Members: C. L. M. Brown, A. G. Linney, R. F. R. Pierce, D. E. Williams.

Associate Members: F. R. F. Davis.

Foreign Members: H. Faillant, A. P. Loening, W. A. Yackey.

Lectures.—On Thursday, February 19, a joint meeting with the Institution of Automobile Engineers will take place at the Royal Society of Arts at 7 p.m., when Lieut.-Col. L. F. R. Fell, A.F.R.Ae.S., will read a paper on "Light Aeroplane Engine Development." Light refreshments will be provided at 6.30 p.m.

On Thursday, March 5, Lieut.-Col. C. B. Heald will read a paper on "Some Medical Aspects of Air Transport," at 5.30 p.m. in the Library at 7, Albemarle Street, London, W.1.

Annual General Meeting.—The Annual General Meeting of Members will be held in the Library at 7, Albemarle Street, at 5.30 p.m., on Tuesday, March 30.

Journal.—The following articles are contained in the February issue of the "Journal of the Royal Aeronautical Society," which is available to non-members, price 2*s.* 6*d.*:—Associate Fellowship announcement; "The Beneficence of Atmospherics," by R. A. Watson Watt; "Cayley on Airships"; "The Use of the Wind Channel to Aircraft Designers"; "The Reaction of a Stream of Viscous Fluid on a Rotating Circular Cylinder," by Major A. R. Low.

W. LOCKWOOD MARSH, Secretary

✱ ✱ ✱ ✱

Belgian Flight to Congo

LIEUT. THIEFFRY, who, as previously reported in FLIGHT, is attempting a flight from Brussels to Belgian Congo in a three-engined Handley Page biplane, started on his long journey on February 12. The "Princesse Marie José," as the machine has been named, rose from Evere aerodrome at 8 a.m. with fair weather conditions. As Lieut. Thieffry and his mechanic, de Bruycker, proceeded, however, the wind increased in violence, and eventually they were forced to descend at Dijon at 2.25 p.m., owing to a faulty feed-pipe. They left for Perpignan the next day, but a heavy snowstorm and a gale forced them once again to land, at Lyons. Continuing on February 15, they left Lyons at 10.18 a.m., and, flying through a strong gale, arrived at Perpignan at 2.3 p.m. On February 16 they left Perpignan at 8.50 a.m. and flew across the Mediterranean to Oran, arriving there at 5.25 p.m. Colomb Bechar was reached next day.

A "Coupé" Airship

THE Goodyear-Zeppelin Corp. of U.S.A., it is reported, is building a small sporting or touring airship having an enclosed cabin accommodating three passengers. The total length of the airship will be 100 ft., and its diameter 30 ft. It will be powered with a 160 h.p. engine.

U.S. Air Services

THE Secretary of the U.S. Navy has informed the House of Representatives Military Committee that President Coolidge is opposed to the unification of the Army and Navy Air Services, which is proposed in a Bill to be introduced by Mr. Curry.

A Long Glide with Passenger

WHAT is claimed to be a record gliding flight with one passenger was made by Lieut. Thoret at St. Remy, near Marseilles, on January 28, when he remained aloft in an aeroplane with the engine stopped for 2 hrs. 26 mins. Thoret, it will be remembered, put up a similar "record" of 1 hr. 9 mins. at Biskra in 1923.

Good Work Accomplished by Aeroplane

IN order to combat an epidemic of diphtheria which is raging at Nome in Alaska, supplies of anti-toxin were successfully rushed to the spot by aeroplane—the usual means of transport being, under the circumstances prevailing at the time, practically useless. It is reported that the pilot who volunteered to fly to Nome is an ex-R.A.F. pilot.

An American Air-Taxi Service

THE Checker Taxicab Co. of San Francisco will start an air-taxi service in April with a fleet of 12 "Swallow" biplanes. The charges will be 40 cents per mile for a single passenger, or 20 cents each for two—the ordinary taxicab charges being 35 cents per mile.

FLIGHT
THE ROYAL AIR FORCE

London Gazette, February 10, 1925

General Duties Branch

Flight Lieut. P. M. McSwiny is granted a perm. commn. in rank stated; Feb. 11. Lieut. H. E. Rew, R. Berks. Regt., is granted a temp. commn. as a Flying Off. on seconding for four years' duty with R.A.F.; Jan. 27. Flying Off. W. B. O. Fox (Capt., Indian Army, retd.) is granted the hon. rank of Flight Lieut.; Jan. 23. Flight Lieut. A. L. Neale, M.C., takes rank and precedence as if his name appeared on the gradation list of Flight Lieuts. immediately below that of Flight Lieut. A. W. Clemson, O.B.E., D.S.C.; reduction to take effect from Jan. 7. Flight Lieut. C. W. Hill is placed on half-pay, scale B; Feb. 11 to Feb. 20 inclusive. Flying Off. F. J. Islip is transf. to the Reserve, Class A; Feb. 8. The short service commn. of Pilot Offr. on probation, F. E. J. Croker-Walsh is terminated; Feb. 11.

Medical Branch

The following are granted short service commns. as Flying Offrs. for three years on the active list, with effect from, and with seny. of, Jan. 28:—C. G. J. Nicholls, M.B., B. Pollard.

Reserve of Air Force Officers

The following are granted commns. on probation in General Duties Branch, in ranks stated (Feb. 10):—

Class A.—Flying Off. S. C. O'Grady, M.C., Pilot Off. L. C. Hillman.

Class B.—Flying Off. K. G. Styles.

Flying Off. J. C. Joynt is transf. from Class A to Class B; Jan. 13. Pilot Off. A. Barron is transf. from Class A to Class C; Feb. 5.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captain.—S. A. Hebden, O.B.E. to School of Tech. Training (Men), Manston, pending taking over command on transfer to Home Estab.; 19.1.25.

Wing Commander.—D. C. S. Evill, D.S.C., A.F.C., to R.A.F. Depot, pending disposal on transfer to Home Estab.; 16.1.25.

Squadron Leaders.—B. P. H. de Roeper, A.F.C., to Aeronautical Committee of Guarantee, Germany; 16.12.24. T. B. Meyer, to R.A.F. Depot (Non-effective Pool); 16.12.24. R. E. Saul, D.F.C., to R.A.F. Depot, on transfer to Home Estab.; 28.12.24. Do., to No. 2 Squadron, Manston; 2.3.25. F. E. Sandford, A.F.C, to No. 10 Group H.Q., Lee-on-Solent, on transfer to Home Estab.; 17.1.25. H. E. F. Wyncoll, C.B.E., M.C., to R.A.F. Depot, on transfer to Home Estab.; 28.12.24.

Flying Officers.—C. A. Mason, to Aircraft Depot, India; 25.12.24. H. S. Hobby, M.C., to Aircraft Depot, India; 9.12.24. G. S. Taylor, to H.Q., Egypt; 1.1.25. H. C. Gammon, to No. 4 Flying Training Sch., Egypt; 15.1.25. R. H. Windsor, to No. 208 Sqdn., Egypt; 15.1.25. B. H. Shaw, to No. 84 Sqdn., Iraq.; 28.12.24. G. H. Elliot, to R.A.F. Depot (Non-effective Pool), on transfer to Home Estab.; 28.12.24. Do., to No. 100 Sqdn., Spittlegate; 9.2.25. E. F. Thorpe, to No. 1 Stores Depot, Kidbrooke; 6.2.25. M. H. Aten, D.F.C., to R.A.F., Cadet Coll., Cranwell; 12.2.25. J. K. Smith, to No. 12 Sqdn., Andover; 16.2.25. H. E. Rew, to No. 4 Flying Training Sch., Egypt, on appointment to a Temp. Comm., on being seconded from the Army; 27.1.25. A. M. West, to R.A.F. Depot, on transfer to Home Estab.; 28.12.24. J. G. Argles, to R.A.F. Depot (Non-effective Pool), on transfer to Home Estab.; 28.12.24. H. Ford, D.F.C., to R.A.F. Depot (Non-effective Pool), on transfer to Home Estab.; 3.1.25. P. L. Binns, to No. 4 Flying Training Sch., on appointment to a Temp. Comm. on being seconded from the Army; 31.1.25. J. C. Barraclough, H. E. Power, W. J. Shilcott, D.S.M., and S. Herbert, to R.A.F. Depot, on transfer to Home Estab.; 17.1.25. F. J. E. Feeny, D.S.O., D. F. Anderson, D.F.C., W. Bourne, F. Miller, R. W. Hill, F. J. Brunton, A. T. K. Shipwright, D.F.C., O. E. Worsley, J. L. Airey, D.F.C., and T. N. Stack, to R.A.F. Depot, on transfer to Home Estab.; 28.12.24. A. M. Reidy, to No. 14 Sqdn., Palestine; 27.12.24. G. A. Atkinson, to R.A.F. Depot (Non-effective Pool), on transfer to Home Estab.; 28.12.24.

Pilot Officer.—D. L. Thomson, to No. 60 Sqdn., India, instead of to Aircraft Depot, as previously notified; 27.11.24.

Stores Branch

Wing Commander.—W. R. Bruce, O.B.E., to R.A.F. Depot, on transfer to Home Estab.; 28.12.24.

Squadron Leaders.—J. A. Stone, to R.A.F. Depot, on transfer to Home Estab.; 28.12.24. H. L. Crichton, M.B.E., to R.A.F. Depot, on transfer to Home Estab.; 17.1.25.

Flight Lieutenants.—A. T. Cooper, to Stores Depot, Egypt; 15.1.25. E. M. Cashmore and L. A. Lavender, to R.A.F. Depot, on transfer to Home Estab.; 17.1.25.

Flying Officers.—R. W. Stevenson, to Stores Depot, Egypt; 15.1.25. A. E. F. McCreary, to H.Q., Egypt; 15.1.25. F. C. C. B. Hichens, to Aircraft Depot, India; 24.1.25. E. P. Terry, to R.A.F., Base, Leuchars; 1.2.25. S. D. Dennis, to R.A.F. Depot (Non-effective Pool), on transfer to Home Estab.; 28.12.24. E. I. T. Duffield, to No. 4 Stores Depot, Ruislip, on transfer to Home Estab.; 28.12.24.

Accountant Branch

Flying Officers.—O. K. Griffin, to Stores Depot, Egypt; 15.1.25. W. A. Wadley, to No. 1 Sqdn., Iraq; 9.1.25. G. W. Lynn, to R.A.F. Depot, on transfer to Home Estab.; 28.12.24.

Medical Branch

Squadron Leader.—D. Blair (Dental), to No. 25 Sqdn., Hawkinge; 9.2.25.

Flight Lieutenants.—E. N. H. Gray, D.P.H., to No. 20 Sqdn., India; 5.1.25. B. F. Haythornthwaite, M.B., B.A., to No. 28 Sqdn., India; 5.1.25. W. E. Barnes, to No. 20 Sqdn., India; 2.1.25. P. A. Hall, M.B., B.A., A. C. Ransford, J. B. Woodrow, and J. Prendergast, M.B., B.A., to R.A.F. Depot, on transfer to Home Estab.; 28.12.24. T. M. Walker, to R.A.F. Depot, on transfer to Home Estab.; 17.1.25.

Chaplains' Branch

Revd. C. W. Hill, to H.Q., Egypt; 7.1.25. Revd. M. J. Eland, to H.Q., Palestine; 27.12.24.

IN PARLIAMENT

Aircraft and Wastage

SIR F. SYKES on February 10 asked the Secretary of State for Air if he will state the number of aircraft written off Royal Air Force charge during the past twelve months by reasons of accident, obsolescence, and general deterioration, respectively; the average period that had elapsed in each case between the time the machines were first taken on Royal Air Force charge and the date of writing off; and the average flying hours in each case of the machines during that period?

Sir S. Hoare: During the twelve months ended October 31 last, 339 aircraft were written off charge owing to accidents and 81 for general deterioration. In each case the average age was about five years and the average flying life about 130 hours. For the purpose of comparison, however, the total age and total flying life are hardly relevant, the date of last reconditioning being a more correct basis for any comparison. I regret, however, that statistics on this point could not be made available without undue labour. In the same way it should be borne in mind that there is no necessary connection between age and hours flown, as most aircraft, particularly in the case of war-time machines, have been for a considerable period in store. During the same period no aircraft were written off of types which were declared obsolete during the twelve months to which the question relates; but 110 were written off which were non-standard at the date of write off, comprising types still in the experimental stage and those previously declared obsolete. Particulars of the average age and flying life of such aircraft would be difficult to compile, and would afford no useful basis of comparison with the other classes.

Sir F. Sykes asked the Secretary of State for Air whether he is able to state the proportion of serviceable aircraft to total aircraft on charge of Royal Air Force flying units at the present time, distinguishing between service units and training units; whether he will state the average proportions for similar units during the last twelve months of the War; and, if not, whether he will state, in regard to each of these types of unit, the extent to which the proportions have improved or otherwise?

Sir S. Hoare: It would not be in the public interest to give the information asked for in the first two parts of the question, while, as regards the third, to examine the statistics for the last year of the War would cause undue labour, and even then the data would probably be found not to be so complete as to furnish a comparable figure.

R.A.F. Motor Vehicles

SIR F. SYKES asked the Secretary of State for Air whether he will state the proportion of motor vehicles to aircraft on charge of the flying units of the Royal Air Force now and at the termination of the War; and, if not, whether he will state the extent to which the present proportion shows a reduction or otherwise?

Sir S. Hoare: The proportion of motor vehicles (viz., motor-cars, touring cars, tenders, lorries) to initial equipment aircraft on charge of flying units is approximately 0·6 vehicle to each aircraft. It is not possible to give a corresponding figure for November, 1918.

Test Assistants (Salary)

MR. H. WILLIAMS asked the Secretary of State for Air if he is prepared to reconsider the terms offered in an advertisement published in several engineering papers for an assistant engineer for the Royal Aircraft Establishment, Farnborough, namely, £3 a week and Civil Service bonus for a professional man with the degree of Bachelor of Science and several years' practical professional experience?

Sir S. Hoare: The terms in question are offered as a commencing salary only to test assistants, not to assistant engineers, and candidates who prove their worth have opportunities of early advancement to a higher rate of pay. I do not consider that in the circumstances they need revision.

Officers' Pay

COLONEL DAY on February 11 asked the Secretary of State for Air if he is aware that the flight officers' rate of pay has been recently reduced from 25*s.* per day to 23*s.* 8*d.* per day to allow for the reduced cost of living, and that since this reduction has taken place the cost of living has steadily risen; and if, in view of this fact, he will reconsider the position and restore to these officers the original rate of 25*s.* per day?

Sir S. Hoare: The reduction of pay on July 1 last was in accordance with the condition attached to the new rates of pay introduced in 1919, that they should be revised in the light of the cost of living in five years' time and thereafter every three years. Revision at a shorter interval is not considered practicable or desirable; nor, if it were so, would it necessarily operate to the advantage of officers.

R.A.F. Cadets' Fees

LIEUT.-COMMANDER KENWORTHY on February 12 asked the Secretary of State for Air whether any decision has yet been come to with regard to the abolition of fees for cadets for His Majesty's Air Force; if he is aware that many young men of promise, including sons of serving officers, are prevented from entering for the officer corps of the Air Force through lack of means; and if he is aware that in the American and Japanese air forces no fees are charged for cadets?

Sir S. Hoare: Any action by the Air Ministry in the direction suggested must necessarily be dependent to a considerable extent on the course adopted in the case of naval and military cadets. I have not yet been able to take a final decision in the matter, but am consulting my right hon. friends the Secretary of State for War and the First Lord of the Admiralty. I may point out that very considerable facilities already exist for the benefit of candidates who would otherwise be debarred by lack of means from entering the commissioned ranks of the Royal Air Force. In addition to King's Cadetships and Prize Cadetships, there is a private benefaction, in awarding which the question of means is taken into special account, whilst the Air Council are empowered to offer annually a number of free cadetships to aircraft apprentices of special promise. Further, cadets receive a daily rate of pay as well as messing allowance from their first entry into the Cadet College. I am aware of the American and Japanese practice in this matter.

Seaplane Service: Marseilles to Iraq

CAPTAIN W. BENN asked whether any proposals have been received for a joint Anglo-French seaplane route from Marseilles, *via* Alexandretta, to Iraq; and, if so, whether any decision in the matter has been arrived at?

Sir S. Hoare: Tentative proposals for a seaplane service of the nature referred to in the question were made last year, but were not pursued.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero-Models Association)

A COMMITTEE meeting of the above council will be held in the ante-room of the Y.M.C.A., Tottenham Court Road, on Thursday, February 26, at 7 p.m. prompt.

Business: To receive reports for the work done during the past twelve months and prepare the agenda for the annual general meeting.

The annual general meeting of the S.M.A.E. will be held in the ante-room of the Y.M.C.A. on March 5, 1925.

Members are specially requested to make every effort to be present. At the end of the meeting, if time permits, Mr. B. K. Johnson, the Technical Secretary, will give a short talk about the actual flying meetings, competitions, etc., held during 1924 and the conclusions drawn from them. Brief intervals for discussion will be made as the talk progresses. The outdoor work will be illustrated by lantern slides.

The Secretary will be pleased to communicate with secretaries of provincial clubs with the hope that inter-club competitions may be arranged for the 1925 season.

A. E. JONES, *Hon. Secretary*

PERSONALS

Married

Flying Officer W. J. BRETT, R.A.F., eldest son of Capt. Brett, Carlisle, was married on February 11 at Barley Parish Church, Herts, to ROSAMOND ELLA, second daughter of Rear-Admiral and Mrs. A. P. DAVIDSON, of Barley, Herts.

REGINALD BAYNES MANSELL, R.A.F., was married on February 7, at the Parish Church, Westbury-on-Trym, to MABEL LUCY PUGH (MOLLY).

Flight-Lieut. T. PIPON, D.S.O., R.A.F., only son of Mr. and Mrs. A. T. M. Pipon, of Beechcroft, Goring-on-Thames, Oxon., was married on February 11, in Brussels, to OLGA DE SELIVANOFF, widow of Lieut. DE KRYPOTINE, of the Russian Imperial Guard.

To be Married

The engagement is announced between Flight-Lieut. H. W. EVENS, R.A.F., eldest son of Mr. and Mrs. W. Evens of Westcliff-on-Sea, and JEAN, youngest daughter of Captain and Mrs. RALPH WHITEHEAD of Blyth, Northumberland.

The engagement is announced between Capt. ARCHIBALD J. R. NAPIER, Cheshire Regt., and R.F.C., Mons Medal, son of Francis Napier, F.R.C.S., of Johannesburg, nephew of the first Lord Napier and Ettrick, and Mrs. Napier, third daughter of Col. William Hope, V.C., and LILIAN GRAY daughter of Mr. C. D. PETERSEN, and of Mrs. PETERSEN, 48, Markham Square, Chelsea, and granddaughter of the Rev. P. A. Wright-Henderson, late Warden of Wadham College, Oxford.

SIDE-WIND

WE have been asked to state that the voluntary liquidation of the Aerolite Piston Co. does not in any way interfere with the production and supply of Aerolite pistons. The goodwill and business, patterns, dies, jigs and tools have been bought by the Light Production Co., of 60-66, Rochester Row, Westminster, S.W.1, and delivery can in most cases be given from stock. The Light Production Co. are in a unique position as regards the manufacture of these patent components, as they have for many years supplied thousands of aluminium alloy pistons weekly to the most famous car and engine builders. The same extreme accuracy which is necessary to satisfy these exacting customers will be put into Aerolite pistons in future.

Aero Golfing Society

THE following is a list of fixtures of the Aero Golfing Society for 1925:—

Winter Meeting, March 5.—At Addington Golf Club. Aero Golfing Society Challenge Cup presented by Sir Samuel Instone.

Spring Meeting, May 7.—At Worplesdon Golf Club. Aero Golfing Society Challenge Cup presented by the proprietors of FLIGHT.

Team Match, May 21.—*v.* Air Ministry, at Cassiobury Park.

Team Match, May 29.—*v.* Stage Golfing Society, at Oxhey Golf Club.

Team Match, June 25.—*v.* Royal Air Force Club. Mid-Surrey.

Autumn Meeting, October 8.—At Walton Heath Golf Club. Aero Golfing Society Challenge Cup presented by Cellon (Richmond), Ltd.

IMPORTS AND EXPORTS, 1924-1925

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; for 1921, see "FLIGHT" for January 19, 1922; for 1922 see "FLIGHT" for January 18, 1923; for 1923, see "FLIGHT" for January 17, 1924; and for 1924, see "FLIGHT" for January 22, 1925.

	Imports.		Exports.		Re-Exports.	
	1924.	1925.	1924.	1925.	1924.	1925.
	£	£	£	£	£	£
Jan. . .	2,213	3,546	52,239	83,728	2,219	291

Death of Mr. J. S. Brown

THE directors of Brown Brothers, Ltd., regret to announce that the sudden death occurred on Saturday last, February 14, of their colleague, Mr. J. S. Brown, who was one of the original managing directors of Brown Brothers, Ltd. Mr. J. S. Brown retired from active work over five years ago, but continued to take an interest in the affairs of the company as an ordinary director.

PUBLICATIONS RECEIVED

Smithsonian Institution: Annual Report of the Board of Regents for the Year ending June 30, 1922. Smithsonian Institution, Washington, D.C., U.S.A.

Aeronautical Research Committee, Reports and Memoranda: No. 926 (*Ae.* 148).—P. 5 Flying Boat N. 86, Impact Tests. April, 1924. Price 6*d.* net. *No.* 927 (*Ae.* 149).—The Characteristics of Thick Aerofoils. By H. Glauert. May, 1924. Price 2*d.* net. H.M. Stationery Office, Kingsway, London, W.C.2.

The Case for More Telephones. The Telephone Development Association, Aldine House, 10-13, Bedford Street, Strand, W.C. 2.

Pocket Calendars for 1925. Alfred Graham and Co., St. Andrew's Works, Crofton Park, London, S.E. 4.

Das Rotorschiff und seine physikalischen Grundlagen. By F. Ackeret. Vandenhoeck und Ruprecht, Göttingen, Germany. Price M1.80.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924

Published February 19, 1925

12,483. E. A. SPERRY. Wireless-controlled aircraft. (227,489.)
26,706. E. FAIRBROTHER and C. S. WINDSOR. Instrument boards. (227,922.)
28,875. H. G. HAWKER ENGINEERING CO., LTD., and F. SIGRIST. Tail construction and adjustment. (227,960.)

APPLIED FOR IN 1925

Published February 19, 1925

2,924. A. R. KUIPERS. Aeroplane wings. (210,802.)
18,010. J. J. CALLAHAM. Propellers. (228,072.)

FLIGHT

The Aircraft Engineer and Airships

36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.
Telegraphic address: Truditur, Westcent, London.
Telephone: Gerrard 1828.

SUBSCRIPTION RATES

"FLIGHT" *will be forwarded, post free, at the following rates:—*

UNITED KINGDOM	s.	d.	ABROAD*	s.	d.
3 Months, Post Free..	7	7	3 Months, Post Free..	8	3
6 " " ..	15	2	6 " " ..	16	6
12 " " ..	30	4	12 " " ..	33	0

These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates.

* *European subscriptions must be remitted in British currency*

Cheques and Post Office Orders should be made payable to the Proprietors of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, *and crossed London County and Westminster Bank, otherwise no responsibility will be accepted.*

Should any difficulty be experienced in procuring "FLIGHT" *from local newsvendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.*